Minute of the NPDGamma Commissioning Meeting at Tucson on November-01 2003

Composed by seppo,
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Attended by:
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Agenda:

NPDGamma Commissioning Meeting at Tucson in November 1, 2003

At DNP our meeting room is conference room #223
We will start at 10am and stop at about 5pm.

Agenda:

10:00	Opening/welcome /seppo	5
	Size of weak n-n couplings /seppo	20
	What we know about schedules /seppo	15
	Experiment- status&plans	
	Monitors /chad	10
	Polarizer /seppo	10
	Analyzer /bill	10
	Spin flipper /scott	10
	Detector /michael	20
	DAQ /scott	10
	Data analysis/michael	15
	Target /mike	20
	Guide field / seppo	10
	Cl target /mike	10
12:45	Lunch break	1h
13:45	Discussion on installation and commissioning /scott	45
	Polarimetry /chad	30
	PV runs with Al, Li, and Cl /all	45

Meeting dinner

Minute of the meeting:

1. Brief discussion on the status of the DDH weak coupling constants: f_π from the TRIPLE data seems to be large, close to the upper limit of the DDH. David's global fit indicates that f_π is zero.

2. Seppo talked about what we know about the cave and beam schedule.
    a. A new estimate is that the cave steel/poly shielding will be in place at the end of November and that December will be consumed to complete the cave work, install power and other infrastructure. December is a short month, the mandatory lab Christmas break starts on 25th.
    b. We have been given a proposal for the beam delivery schedule for December and January-April:
        i. On December 4-8 there will be "a long-pulse test". If you want to know more please let us know.
        ii. December-9-18 normal 1L production. We will have beam on FP5 for the monitor testing.
        iii. January 10 starts the 1L target production which will continue till mid April with regular breaks. Average production days per month is about 20.
        iv. Then will follow a several months long facility maintenance break. The facility has not indicated the length of this break. They need to do serious work with the linac like full alignment, fix some of the RF tanks, and so on.
3. Chad discussed on the beam monitors
    a. We will have beam time in December (9-13) on flight path 5 to test and tune the monitors. Chad has estimated signal sizes on FP5 where we will have a less intense cold neutron beam than in FP12 (FP5 is viewing a water moderator) and also the size of the beam will be smaller because of the existing collimation. A plan is to have the feed back resistor values in the pre amplifiers close to the values estimated for FP12 and use an external amplifier if required to gain usable signal size. Chad is working with detailed planning of the measurement.
    b. Beam monitor M1, in the NPDGamma M1 is used to monitor the incident beam with the accuracy of about 2%.
    c. The target ortho/para ratio measurement in transmission with M2 and M3. We need to do MCNP calculations to find out the fraction of beam that comes out from the back of the target – we need to define the back collimation for the analyzer and the back monitor.
    d. We need to understand cave background problems of M3 in FP12. M3 is black for the cold neutrons but sees the fast neutron cave background and also the backscattered neutrons from the beam stop.
4. Chad was leading discussion on polarimetry.
    a. The NPDGamma polarimetry includes;
        i. a study of the performance of the 3He polarizer during the commissioning phase and monitoring of the polarizer in the experiment
        ii. measurement of spin flipper efficiency and monitoring of the spin flipper performance during the experiment
        iii. measurement of the beam polarization after it has passed the LH2 target.

For these measurements we need different combinations of analyzer and monitors.

b. According to the specifications performance of M1 and M2 is equal. M1 and M2 are used to beam polarization measurement in transmission. We need to study how accurately we can measure the beam polarization in transmission without having a frequent measurement with the cell with zero polarization. We should aim to a 5% beam polarization measurement.
c. Analyzer. We need to check the analyzer performance; do we have proper analyzer cells – diameter and 3He thickness.
d. Spin flipper efficiency measurement was discussed.
    i. The topic needs more thinking, David is working with this. To have a good plan for the efficiency measurements we need to know the effective spin flipper field. Pil has mapped the spin flipper magnetic field and this should agree with calculated ones. We need a model that helps us to design the spin flipper efficiency measurement
    ii. Since the spin flipper RF field is solenoidal, the amplitude of the field depends on the radial coordinate. First, we need to measure the efficiency on the beam axis and then off axis. Then we need to optimize the efficiency by selecting the right RF amplitude.
e. Beam polarization after the target. We have a draft for a paper Dawson et al. "Depolarization of cold neutrons by liquid hydrogen". Result of this work can be turned to a simple model that can be used to estimate the beam polarization after the target and thus allow to estimate the analyzer signals.

5. Polarizer: The polarizer components are arriving to LANL. In the last part of November the polarizer will be reassembled and tested. The new stand that fits to the cave has been built at LANL. At the cave the polarimetry runs as well as the first measurements of systematics will be done with the 100-hour cell. When the polarizer will be assembled and tested at LANL the UNH collaborators will participate.
6. Analyzer. We need to revisit our available analyzer cells and see that we have a cell that can be used. Issue is the 3He thickness. Analyzer system has been developed and tested at UNH and will be moved to LANL as soon as the polarizer testing is done.
7. Spin Flipper: The spin flipper has been part of the detector testing. By changing the thickness of the entry/exit Al windows the additive and multiplicative detector signals have been measured. The goal is to see that the detector and its electronics do not pick up any spin flipper RF field that could cause a false asymmetry.
8. CCl4 target: Indiana has a new design for the CCl4 target and its mounting mechanism. The drawings will be circulated. We need to decide the size of the neutron shielding inside the spin flipper so that the final diameter of the CCl4 target can be fixed. The CCl4 target with its Teflon body will be a strong neutron scatterer, we need to have a heavy neutron shielding on the upstream of the

detector. Do we need to measure parity violation on fluorine. Teflon has a lot of fluorine.

9. General discussion on the shielding around the experiment to protect the detector against neutron activation. ^{133}Cs has at 5.9 eV a very strong s-wave resonance and at higher energies many other. ^{133}Cs has also a significant capture cross section with the 1/v dependecne for cold neutrons – 29 barn at 2200 m/s.
    a. The biggest source of the scattered neutrons is the LH2 target. We will have a ^{6}Li plastic aligner in the cryostat to stop the cold neutrons but we cannot do much to the fast neutrons. Pil and Eduard Sharopov are studying this problem with MCNP.
    b. The large source of the scattered neutrons is the beam stop. We are in the process to perform MCNP calculations to estimate fast neutron flux through the LH2 target. W need to think how to terminate this flux properly so that we do not have a big back scattered neutron flux going back to the detector. We need to make a plan how to terminate neutrons that do not enter the beam stop. Also the beam stop has to be designed to minimize back scattering. The beam stop has been built but we can install an insert to improve it neutronic performance.
    c. The polarizer – its class windows – are also a strong source of scattered neutrons. About 20% of incident neutrons will scatter.
    d. We need some MCNP modeling to understand where we have a neutron problem and how mitigate it.
10. Brief discussion on targets for systematic studies. We will run at least Al, ^{6}Li, Cl, and maybe B. We need to work more to find out expected PV signals and how long we need to run these targets. How to fabricate the targets.
11. Michael Gericke lead the detector discussion. He has very nice results. The detector technical note that is in the NPDGamma home page, describes nicely the status and the results. He is working with a publication from the detector test results.
    a. Still work needs to be done with the pedestal noise.
    b. Some of the amplifiers have access noise that can be decreased.
    c. Gain fluctuations due to cosmics need to be studied
    d. Temperature dependence of the gains need to be measured.
    e. The TRIUMF gain setup modules that allow the gains to be changed by computer from 80% to 120%, have to be tested.
12. DAQ.
    a. We still have a problem with the ADC. With fixed number of T0s the first data set is ignored. We have a solution to avoid the problem but we try to find out if this unwanted feature could be fixed.
    b. Data storage: Data rate is about 50Gbyte/day and will be stored to a 3Tbyte data array but we need to have a copy of the data. A proposal is to transfer data to a removable disk with 250Gbyte capacity. The price of the disk is about $500/disk.
    c. All the components of the experiments start to be ready. We need again to visit the issue what signals and information and how the subsystem

computers will feed to the DAQ. We have five standalone subsystem computers: chopper, polarizer, guide field, detector stand, and LH2 target.

13. Data analysis: The data analysis package has been developed with the analysis of the detector test data. We still need to agree how we are going to have data analyzed/displayed online. Soon we will have a first draft of the user manual for data analysis that will go to the circulation.
14. LH2 target discussion was lead by Mike Snow.
    a. Target is at LANL and was assembled and partially tested in a shed next to ER2.
    b. The Al vessel, ^{6}Li shielding, rest of plumbing, and instrumentation will be installed next and then the target will be tested without hydrogen.
    c. We are working toward hydrogen testing in the shed. For that we have to redesign some of the vacuum lines, relief system, and vent lines. The shed needs also some minor modifications.
    d. Work for hydrogen approvals is underway. We are working with HCP and IWDs, and safety review. The safety review requires that the hardware is in place and the necessary safety paperwork complete.
    e. Completion of the PLC programming is going on at IUCF
    f. Satyaranjan Santra – IUCF postdoc – will come more permanently to LANL in December to work with the target.